arcadian

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SUBSCRIPTION for 1980 is $10. Now that this issue is out, the address label program will be reset to zero, so take heed. We have started to translate the HANDBOOK (page shown on p.83) so those outputs will take prominent positions in next year's issues.And there will be material on utilization of the keyboard/memory unit I'm having developed. Plus programs and who knows what?

REVIEWS of 'commercial' programs start in this issue with a comprehensive output by Dick DeForest. We have received a suggestion that it might be useful to some to have reviews of the Bally games. As the Bally distribution shrinks, mail order becomes the mode of purchase. Prospective purchasers would like to know the worth of the Bally outputs, and if anyone could review these, it would be a service to those distant from a dealer.

SOUTHERN INDIANA subscribers are urged to contact Dave Stocker or Guy McLimore 479-7336 if they are interested in a local user group.

ASCII KEYBOARDS have been successfully interfaced to the Bally Arcade, report two subscribers. In brief, these keyboards replace cassette tape as the BASIC input source. The schemes differ slightly in that one of them (Jerry's) has simulated the Kansas City Standard in order to transfer the ASCII keyboard data, and the other (Ed's) bypasses the Kansas City Standard phase and provides a serial data stream from the ASCII keyboard to the audio cassette adapter. Both schemes require some audio cassette hardware modifications as well as some circuit assembly.

They both provide the look and feel of keyboard input for all except Basic "Key" words (LET,FOR,etc.) These key words are generated from the ASCII keyboard by depressing a lower-case alpha character (e.g. PRINT is entered by typing a lower-case t).

For further information, contact the authors directly:

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The above was written by Tom Wood, based on data submitted by Jerry and Ed.

ANOTHER NEWSLETTER? You will note an ad by Fred Cornett who is proposing a new source of information for the Bally. We certainly need all of the software we can get, for review and analysis of the techniques used in a program is a self-improvement scheme. However, I don't know if there is enough market out there for a commercial newsletter-type operation such as Fred is proposing. I haven't seen any of the material he discusses in his prospectus, which outlines some ambitious goals.

BALLY GAMES should have two new members in the immediate future - PINBALL (or BALLY PIN) and SPACE INVADERS should be available at $24.95.

RESEQUENCING program by Ron Schweitzer is really a renumbering scheme to be used when you finish up a program and want to have a nice sequence of lines that are a constant interval apart (like 5,10,15,20,etc). Dick Houser has gone over the program and written some comments about it.

PA-1 SERVICE MANUAL is being reprinted by Bally, which is why a couple of dozen subscribers are patiently waiting. All other orders for printed material have been sent out.

FIRST REVIEW received from Richard DeForest. We are working on a standardized form and will have it in the next issue.

Sebree's Computing, T.Hays-programer
Program games are, UFO BATTLE, DOWN THE TRENCH, HIT THE PEDESTRIAN, SUBMARINE MINE FIELD, MUNCH AND SUPER WUMPUS.
Also submitted was MATH ROUTINES.

Received all of the above on two tapes. Neither tape would load into my machine as readable progrms until I rerecoarded them with another tape player into my tape player.

UFO BATTLE- Game has great sound effects and screen changes. the explosions are the key to this program. Do not cheat by keeping TR(1) pulled. I did and ended up with a score of 29,853 on the third try!!!

DOWN THE TRENCH- In my opinion this is the best of the games. The program demands dexterity, perseverence and concentration to succeed in the mission. Outstanding sound and 3D graphics. A very good program utilising the memory of the BALLY.

HIT THE PEDESTRIAN- Another 3-dimensional game to keep you on your toes. The man falls apart if you move KN(1) to fast. Make the below changes and you will stop this situation and have about 200 bytes left or 11% of the memory to improve the sound or graphics

```
  205 Q=1000;GOSUB Q
  210/530 change all lines with BOX KN(1)÷2+M,-,-,-,- to read
                  BOX Z(+or- if called for),-,-,-,-
  290, 375, 452, 490 change to  CLEAR ;GOSUB Q
 1000 Z=KN(1)÷2+M;RETURN
```

SUBMARINE MINEFIELD- Moving the sub through 230 mines is tricky and if you add 3 depth charges or scanning mines you have lots of problems. This one has a realistic sea bottom that is alive with creatures (the stack being manipulated causes this illusion). Find 14 bytes and change line 52 to read BOX 0,40, 160,1,1;FOR A=1TO230 to show sea level. IF PX(-,-) described in Oct. ARCADIAN was used to detect for mines.

MUNCH- This one is full of supense. It has enough memory left to add a search routine to check that at least one bit is removed from the screen or to subtract points from the player.

SUPER WUMPUS- If you have never hunted Wumpi, then try this game. Excellent use of different sound effectsand use of dual sound effects are unique. This program has two listings. The first is to instruct the player and the second is the game. This saves the memory for the many branches, subroutines and sound effects.

MATH ROUTINES- For 3-dimensional graphics. This program calculates sine, cosine and arctangent more than accurate enough for the integer basic of the BALLY. The square root has a fast and a slow version depending on the accuracy needed.

SUMMARY- All programs come with listings and complete documentation. They use all of the functions of the BALLY BASIC and have several unique sound effects. Instructions are duplicated in listing and program and this uses up memory which could be put to better use.

MEMORY ADDRESSING and BALLY TINY BASIC

As mentioned in previous ARCADIANS, the 4K of RAM contained in the ARCADE is used by Bally software in several ways:

The first n bytes (n determined by the value of the Vertical Update Register, Port 10D) are used for video generation. Within this n bytes, each pair of bits defines one pixel starting with bits 7 and 6 of relative byte 0 (absolute address 4000H or 16384D) and continuing thru bits 1 and 0 of relative byte n-1.

The remaining 4096-n bytes are used by the on-board operating system, the on-board games and the game cassettes for any required variable data storage.

Concerning ourselves first with the "picture area" or that area of RAM that is permitted (by the Vertical Update Register) to be displayed, we find that each 2 bit quantity represents a 1-of-4 color value for the respective pixel. Which specific color is displayed for a given pixel depends upon the value of the 2 bits defining that pixel, the values output to Ports 0-7 and Port 9 as well as the left-to-right position of that pixel on the screen.

The "variable data" area, on the other hand, is used as in any 8 bit computer. Data values are stored, worked upon and retrieved on a byte (8 bits)-by-byte basis. Any need for a large data area will, of necessity, reduce the amount of memory available for --and thus the vertical size of-- the display.

Bally Basic requires only slightly more than average space for this data area with two important exceptions: The actual Basic Program that is to be executed (interpreted) and any associated Strings. The people at Bally have introduced a rather cute programming trick or two to provide all this storage and still leave a display on the screen, all in 4K of memory. The first trick reduces the number of available colors from 4 to 2, the second involves a modified memory addressing scheme.

If the number of available colors is reduced to two, then one bit in every two-bit pixel becomes useless for display. For example, let us assume the screen is made "all right" by outputting a 0 to the Horizontal Boundary Register (Port 9). Let us further assume that a 7 (white) is output to Ports 0 and 1 and a 0 (black) is output to Ports 2 and 3. The result is that a two-bit pixel value of either 00 or 01 will cause white to be displayed for that pixel and a two-bit pixel value of either 10 or 11 will cause black to be displayed for that pixel. It is seen, then, that the least significant bit of every two-bit pixel is no longer needed for display purposes and can be used for something else. That new use is the Basic Program and String storage. Cute, huh?

For those who like to calculate, the following is offered:

Screen (RAM) start	4000H (16384D)
Bally Basic data start	4E18H (19992D)
Program and String area length	0E18H (3608D)

Since only alternate bits are available, the actual Basic Program storage area is 3608D/2 = 1804D.

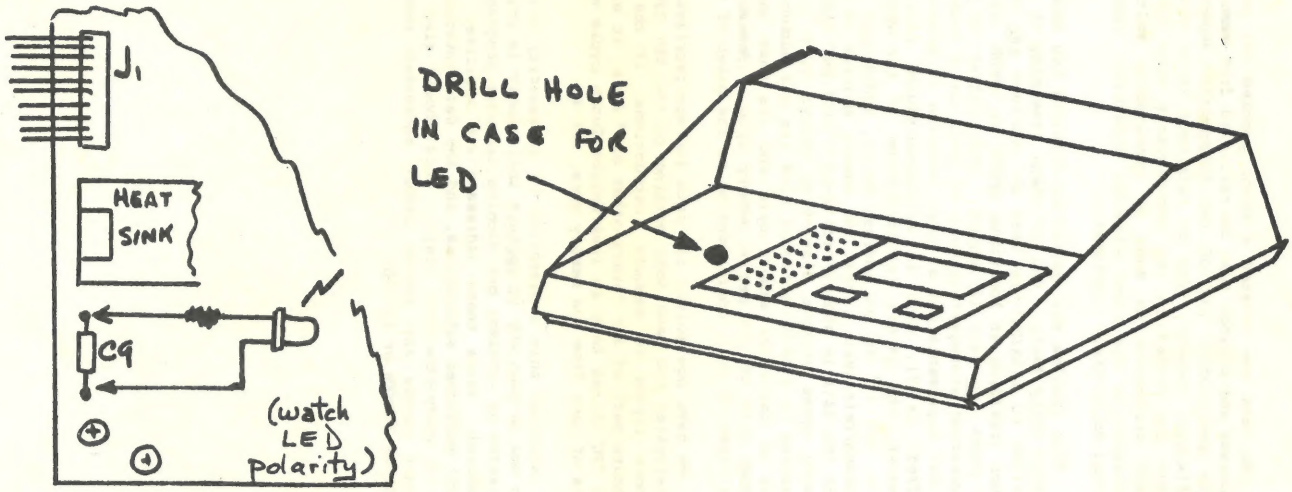
We have now created a minor problem for ourselves, however. Basic Programs and Strings must be retrieved from memory by reassembling 8 bits from every other bit of two consecutive memory bytes. Basic Program Variables, however, must be retrieved as-is from the Variable Data area (they are stored in the non-viewable area of memory). In evaluating Basic statements we must be continually switching from one mode of retrieval to the other without, hopefully, impacting the design of the actual Bally Basic Inptepreter.

This problem was solved by creating two machine-language subroutines within Bally Basic. One of these (residing at locations 2FCFH to 2FE6H (12239D to 12262D)) is used to retrieve any data from memory and the other (residing at locations 2FE7H to 2FFEH (12263D to 12286D)) is used to store any data in memory. When either of these routines is called requesting storage/retrieval of data in a location in memory, and the 16-bit representation of that location is positive (i.e. bit 2^{15} of the address is 0), data is retrieved/stored as-is in 8-bit bytes. If, however, the 16-bit representation of the memory address is negative (i.e. bit 2^{15} of the address is 1), additional action is taken prior to storage/retrieval. First the memory address is doubled (without carry), then the data is stored/retrieved 4 bits per byte from/to two consecutive memory bytes without disturbing unused bits. Specifically, any 8 bit quantity is stored/retrieved with its odd number bits in the even number bits of the first memory byte and its even numbered bits in the even number bits of the second memory byte. (Remember bits are counted from the right, 0 to 7, corresponding to the power of two that bit represents.)

We have now solved all data storage/retrieval problems for the Basic Interpreter and have done nothing to the Z80 CPU. When cycling through memory trying to execute instructions, if the CPU is ever caused to execute part of our "every other bit" data, it will not know what to do. The CPU thinks that an instruction fetch cycle will provide 8 meaningful bits of data from one memory byte, not 4.

Although this explanation is necessarily brief, it is hoped that it can now be seen why it appears that memory is present from A000H to A7FFH (-24576D to -22529D) but machine language programs stored there cannot be executed. Since these addresses are negative, they are doubled by the above mentioned subroutines, and any data interchange with memory is done on an every-other-bit basis. This should also explain why Bally Basic cannot access any add-on memory addressed above the highest positive address (7FFFH or 32767D).

POWER ON INDICATOR was suggested by Ed Mulholland, and the following sketch comes from Chuck Zellers showing how it can be done. The hole in the top cover should be big enough so that the LED protrudes, and is not constrained(so the cover is easily replaced). The legs of the LED are strong enough for this. Once you solder the LED/resistor across capacitor C9, position the LED vertically and put a dab of vaseline, heat sink grease,etc., on the tip, then lower the cover. The grease will make a mark on the cover, telling you where to drill the hole. Radio Shack (ugh) parts are 276-041 LED, and 271-030 resistor, 4.7Kohm, ¼watt.(almost any value resistor will work) I prefer PolyPaks at about 25% the cost.



TELEPHONE COUPLER mentioned previously (p.58) apparently will not work with GTE telephone equipment. Chuck Zellers proposes using an 8 ohm to 2Kohm impedance matching transformer with the speaker on the 8 ohm side.

MICROTREK by Bill Andrus (7034 Thomas Dr., N.Highlands,CA 95660) is a very small but interesting version of the Star-Trek game. This version was originally shared by the North Carolina TRS-80 User Group. In playing, watch your energy level and remaining time.

Command Summary:
1) Move to Sector (row,column)- On an 8 x 8 quadrant of sectors, you can move to any legal, unoccupied sector. If you are adjacent to a Starbase, you are docked, restoring your energy and in a safe haven from which to fire. If either sector command is zero, the command is cancelled.
2) Move to a New Quadrant-extends search for Klingons and Starbases.
3) Fire on Sector (row,column)-Watch energy. Again, if either value entered is zero, the command is cancelled.
4) Sensor Report(of current quadrant): * are stars; B is StarBase; K is Klingon; and E is Enterprise
5) Status Report:These are optional,upon-request displays

An extended version is available from Bill at $1.50 your tape, 3.50 on his.

PROGRAM NAME MICROTREK 1

Line #	Statement(s)
1	.MICROTREK
2	.BY BILL ANDRUS
20	:RETURN
30	CLEAR;NT=0
40	D=RND(40);IF D<30 GOTO 40
50	W=RND(35);IF W<10 GOTO 50
60	D=(D*W)÷20;L=10000
70	PRINT" *MICRO TREK*"
100	A=0;K=0;S=10;T=10
110	FOR I=1 TO 64;@(I)=0
120	X=RND(12);IF X>2 @(I)=1
130	IF X=3 IF K<W @(I)=2;K=K+1
140	NEXT I
150	X=RND(64);IF@(X)>1 GOTO150
160	@(X)=3;GOSUB 850;B=RND(17);IF B>5 GOTO 200
170	X=RND(64);IF@(X)>1 GOTO170
180	@(X)=4;S=(X-1)÷8;T=X-S*8
200	CLEAR;C=-S;IF C<0 C=-C
210	G=F-T;IF G<0 G=-G
220	Q=0 IF C<2 IF G<2 Q=1
230	D=D-1;IF D=0 GOTO 970
240	IF (K=0)+(Q=1) GOTO 270
250	GOSUB 860;PRINT#4,H,"UNIT HIT FROM"
260	PRINT"KLINGONS!"
270	IF Q=1 L=10000
280	INPUT "COMMAND: "A
290	IF A=1 GOTO 350
300	IF A=2 GOTO 400
310	IF A=3 GOTO 450
320	IF A=4 GOTO 550
330	IF A=5 GOTO 650
340	GOTO 280
350	GOSUB 920;X=(Y-1)*8+Z;IF @(X)#1 PRINT"SECTOR OCCUPIED";GOTO 350
360	U=1;GOSUB 870;@(X)=3;@(E*8+F)=1;GOSUB 850;GOTO 200

PROGRAM NAME MICROTREK 2

Line #	Statement(s)
400	G=RND(250)+300;U=1;GOSUB 900;GOTO 100
450	GOSUB 920;U=2;GOSUB 870;X=(Y-1)*8+Z;U=@(X);IF U<2 GOTO 230
460	IF U=3 PRINT"YOU DESTROYED YOURSELF!!";GOTO 990
470	IF U=4 PRINT"STARBASE DESTROYED!!";S=10;T=10;GOTO200
480	IF R>500 IF(RND(R÷500)+6)>10 PRINT "YOU MISSED!!";GOTO 230
490	@(X)=1;K=K-1;W=W-1;IF W>0 GOTO 230
500	PRINT"MISSION ACCOMPLISHED!!";GOTO 990
550	CLEAR;GOSUB 630
560	FOR I=1TO8;PRINT#1,I,;FOR J=1TO8
570	X=@((I-1)*8+J);IF X=0 PRINT " * ",
580	IF X=1 PRINT" . ",
590	IF X=2 PRINT" K ",
600	IF X=3 PRINT" E ",
610	IF X=4 PRINT" B ",
620	NEXT J;PRINT#1,I;NEXT I;GOSUB 630;GOTO 280
630	PRINT" 1 2 3 4 5 6 7 8";RETURN
650	CLEAR;PRINT" STATUS REPORT"
660	PRINT"SECTOR:",#17,E+1,",",#1,F
670	PRINT"STARDATE:",#17,D
680	PRINT"ENERGY:",#19,L;PRINT"KLINGONS:",#17,W
690	PRINT"CONDITION: ";GOSUB 700;GOTO 280
700	IF Q=1 PRINT"DOCKED";RETURN

PROGRAM NAME MICROTREK 3

Line #	Statement(s)
710	IF K>0 PRINT" RED";RETURN
720	IF L>2000 PRINT" GREEN";RETURN
730	PRINT"YELLOW";RETURN
850	E=(X-1)÷8;F=X-E*8;RETURN
860	H=(RND(50)+200)*K;G=H;U=1;GOTO 900
870	R=(((Y-E)*(Y-E))+((Z-F)*(Z-F)))*100
880	G=R÷10;IF G=0 RETURN
890	J=G;G=(R÷G+G)÷2;IF G<J GOTO 890
900	L=L-U*G;IF L>0 RETURN
910	PRINT "OUT OF ENERGY!!";GOTO 990
920	INPUT"SECTOR ROW: "Y;IF Y=0 GOTO 280
930	IF (Y<1)+(Y>8) GOTO 920
940	INPUT"SECTOR COLUMN: "Z;IF Z=0 GOTO 280
950	IF (Z<1)+(Z>8) GOTO 940
960	RETURN
970	PRINT"OUT OF TIME!!";GOTO 990
990	PRINT"GAME OVER."

RESEQUENCING Program by Ron Schweitzer

This program will renumber a Bally BASIC program and print the renumbered program on tape. It will fix GOTO and GOSUB as long as they are not computed, i.e. GOSUB C, where the C will not be changed. However a GOSUB 12Ø+C will be changed if there is a line number 12Ø. It is slow, but still faster than editing. This program is 473 bytes long as written here but can be shortened to ...

426 bytes by deleting Line 2ØØØØ
377 bytes by above and deleting Line 2ØØ5Ø
366 bytes by above and changing Line 2ØØ4Ø to INPUT".FL#"O,".SP"G;:PRINT
349 bytes by above and changing Line 2ØØ8Ø to NEXT A;PRINT ":RETURN";STOP

This program requires a "@(X)" for every line in storage. The resequence program is renumbered along with the object program. Spacing between the two programs can be accomplished by adding some dummy lines after the object program.

Notes on Ron's program, by R.M. HOUSER

First key in the program of the byte length that you want. Then dump this on a cassette and plan on saving it. Now RESET the BALLY, and load the object program into memory from its tape. When finished, load the resequence program after it. This can only be done if there is enough memory space and you do not have a conflict in line numbers.
Now add Line 1 GOTO 2ØØØØ (GOTO 2ØØ1Ø if 2ØØØØ has been deleted per above)
Now push WORDS RUN GO and the CRT will show 'RUN'. After a short wait . . .
The computer will ask for 'START NO'. Put in Ø, this will automatically set 'FL#'
and get rid of GOTO 2ØØØØ (or 2ØØ1Ø) later on, and make the first line be Ø+Spacing. At this time start the tape recorder with a new tape to load the renumbered program on. The computer will now ask for 'SPACING' and enter the line interval you wish . . . '.SP'
You will now see the object program be renumbered on the CRT. When you see that the renumbering has reached the resequence program (2ØØØØ or 2ØØ1Ø), stop the tape recorder to save having to delete these lines later.
NOTE ::: The program stored in the Bally memory is still the old line numbered program, The renumbered program is on the tape. If you now RESET the Bally and load the tape, you will see some garbage at the beginning that will drop out later when the program is run. List the program and delete any lines of the resequence program. Load the program on a clean tape. If you have a long program, you will probably have to break it into two, and some of the GOTO and GOSUB may have to be edited by hand. : : : Thanks for this program Ron.

POOR RESPONSE from Apple TV and Computing (Dick Stroik) 2606 S. Robertson Blvd, LA 90034 has been reported. If you have had any negative dealings with this company, drop a line to R.Tietjens 3226 E½ Road Rte 2, Clifton CO 81520.

A CLUB has been started in the Grand Junction area that meets at Mr. Tietjens' house on the second Tuesday of the month at 7pm.

CHECKERS CORRECTION by the author, John Collins-

```
line 260 should read     S=U-B+F; IF @(5)=3 J=1
line 620 should read     IF @(U+F)=3 IF @ (U+C-F)=1 RETURN
```

PROGRAM NAME RESEQUENCING

USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

ENTER A SPACE BETWEEN LINE # AND STATEMENT. THIS IS DONE BY THE UNIT

Line #	Statement(s)
20000	.RESEQUENCING BY
	RON SCHWEITZER
20010	N=0:@(0)=%(-24576)
20020	FOR A=-24574 TO A+1796-SZ:
	IF %(A)÷256#13 NEXT A
20030	N=N+1:A=A+2:@(N)=%(A):
	NEXT A
20040	INPUT".START NO"O,".
	SPACING"G:: PRINT
20050	PRINT:PRINT:PRINT".FROM
	LINE",#0,O,"TO LINE
	",(N-1)*G+O,"STEP",G:
	PRINT:PRINT
20060	M=0:GOSUB 20120:FOR A=
	24574 TO A+1796-SZ:TV=%(A)
	:B=%(A)÷256:IF(RM=13)+(RM
	=-243)GOSUB 20120
20070	IF(RM=110)+(RM=111)GOSUB
	20090
20080	NEXT A:PRINT:PRINT:PRINT
	":RETURN:NT=0":RETURN:NT=0
	:STOP
20090	T=0:FOR B=A TO A+5:IF(%(B)
	÷256-53)÷6=0 T=T*10+RM+5:
	A=A+1: NEXT B
20100	FOR B=0 TO N:IF @(B)=T
	PRINT #0, B*G+O,:RETURN
20110	NEXT B:RETURN
20120	PRINT #4,M*G+O,:TV=32:
	M=M+1:A=A+2:RETURN

GROUP MEETINGS are being held at Bruce DeVries' home, 2036 North Highland, Apt.B, Orange CA (714) 637-5700 repprts Bob Moore. These are held on the second Wednesday of the Month.

ADS

W&W report that they now have seven tapes available with five programs each, and $10 per tape. See last issue for address.

DEALER SELL-OUT a success. We still have some items in stock, selling at cost. As a special offer to ARCADIAN subscribers we will special order any Bally products at a very special price. Send stamped self addressed envelope(SSAE) for price list to VIDEO ENVIRONMENT +, INC 580 New Loudon Rd. Latham NY 12110

A program & information exchange has been established for "Arcade" users. For further information, send SASE to: F.Cornett,6115 Clybourn #25, North Hollywood, CA 91606

FOR SALE: BALLY ARCADE WITH 4 PISTOL GRIPS, $229. BASIC CARTRIDGE, $29.95; BASEBALL/TENNIS/HOCKEY/HANDBALL, AND 280ZZAP/DODGEM, EACH HALF PRICE. R. BENNINGTON, P.O. BOX 1021, SOLANA BEACH, CALFORNIA 92075. (714) 481-8420.

INVASION is offerred by George Collins, 30 Sierra Ave., Piedmont,CA 94611 on a tape for $5 with documentation.

REVIEW OF THE BALLY SYSTEM is contained in an article by Dick Nitto in the November issue of KILOBAUD

More Ads

Programmer Wanted:Business programs written for small quick-printer. Herb Weintraub Instant Printing, 205 North Tradd St. Statesville, NC 28677

FREE shipping on any order and 10% off any orders over $50. Complete line of Bally products, Also Arcadian software (?rf) for sale or trade Winsor Computers, 466 Selfridge Dr., Colorado Springs CO 80916 (303) 596-4921

DIGITRENDS Inc 1813 E. 12 St. Cleveland OH 44114 are still carrying the complete software/hardware line in the Ohio area.

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